

DR. EVA C. HERBST

Biomechanist and functional morphologist using and developing digital tools to determine how joints and anatomical structures work. Extensive experience in joint range of motion analysis, 3D modeling, and finite element analysis

PERSONAL INFORMATION

ADDRESS: Palaeontological Institute and Museum
Karl-Schmid-Strasse 4, 8004 Zurich, Switzerland
EMAIL: eva.herbst@pim.uzh.ch

[Website](#) - [GoogleScholar](#) - [Github](#) - [Figshare](#) - [Morphosource](#) - [Publons](#) - [Orcid](#)

TECHNICAL SKILLS AND PROGRAMS

CT SEGMENTATION AND 3D MODELING	Mimics, Avizo, Blender, Rhino, photogrammetry
ANALYSIS AND SCRIPTING	Matlab, Python, Java code on Github
FINITE ELEMENT ANALYSIS & MULTIBODY DYNAMICS	Hypermesh, Abaqus, Artisynth
SCIENTIFIC ROTOSCOPING AND ANIMATION	Maya
JOINT RANGE OF MOTION USING MOTION CAPTURE	Qualysis and Matlab
OTHER PROGRAMS	Latex
OTHER SKILLS	joint dissections

EDUCATION

OCT 2016 - APRIL 2020	PhD in Biomechanics and Palaeontology <i>Structure and Motion Lab, Royal Veterinary College, London</i>
AUGUST 2012 - MAY 2016	B.A. in Integrative Biology <i>U.C. Berkeley</i>
OCT 2013 - JUNE 2014	Degree of Higher Education in Biomedical Sciences <i>Durham University Study Abroad, Certificate of Higher Education</i>

EMPLOYMENT AND RESEARCH EXPERIENCE

DEC 2019 - PRESENT	Postdoctoral Researcher <i>Investigating form and function of Triassic reptile skulls Palaeontological Institute and Museum, University of Zurich</i>
OCT 2019 - PRESENT	Lead Researcher OATech+ Network Pump Priming Project <i>Analysing bony architecture to monitor osteoarthritis of the knee Royal Veterinary College, London and University of Zurich</i>
OCT 2019 - DEC 2019	OATech+ Network Early Career Researcher Placement <i>Osteoarthritis project, Skeletal Biology Group, Royal Veterinary College London</i>
OCT 2016 - APRIL 2020	PhD in Palaeontology and Biomechanics <i>Structure and Motion Lab, Royal Veterinary College, London</i>

- OCT 2016 - APRIL 2020 PhD in Palaeontology and Biomechanics
Structure and Motion Lab, Royal Veterinary College, London
- MAY 2016 - JULY 2016 National Science Foundation Research Experience for Undergraduates Project: *Comparative Biomechanics, Palaeontology, and Evolution, University of Missouri*
- SEPT 2015 - MAY 2016 Undergraduate Research Apprenticeship Program
Hummingbird Flight Analysis, U.C. Berkeley
- SEPT 2014 - MAY 2016 Research Assistant and Archivist
Human Evolution Research Center, U.C. Berkeley
- JUNE 2013 - MAY 2016 Research Intern and Staff
Safari West Osteology, Santa Rosa, California
- SEPT 2014 - MAY 2015 Undergraduate Research Apprenticeship Program
Rodent Mandible Morphology Project, U.C. Berkeley

HONORS AND AWARDS

- 2021 **D. Dwight Davis Award, Society of Integrative and Comparative Morphology**
Best student oral presentation in the Division of Vertebrate Morphology
- 2020 **Swiss Commission of Palaeontology Prize**
Best presentation in palaeontology given at the Swiss Geoscience Meeting
- 2016 **Franklin M. Henry Award, Integrative Biology, UC Berkeley**
Outstanding achievement in human performance and health research
- 2016 **Distinction in General Scholarship, UC Berkeley**
Awarded to graduates achieving high grade point average
- 2013, 2015 **Dean's Honors, UC Berkeley**
Awarded to graduates achieving high grade point average

PEER-REVIEWED PUBLICATIONS

* denotes co first author

- 2022 **Herbst, E. C.**, Lautenschlager, S., Fioritti, N., Meade, L., Scheyer, T.M.
A toolbox for the retrodeformation and muscle reconstruction of fossil specimens in Blender
[Royal Society Open Science](#)
- 2022 **Herbst, E. C.**, Eberhard, E., Richards, C., Hutchinson, J.R. *In vivo* and *ex vivo* range of motion in the fire salamander *Salamandra salamandra*. [Journal of Anatomy](#)
- 2022 **Herbst, E. C.***, Eberhard, E.*, Hutschinson, J. R., Richards, C. Spherical frame projections for visualizing joint range of motion, and a complementary method to capture mobility data
[Journal of Anatomy](#)
- 2022 **Herbst, E. C.***, Manafzadeh, A. R.*, Hutchinson, J. R. Multi-joint analysis of pose viability supports the possibility of salamander-like hindlimb configurations in the Permian tetrapod *E. megacephalus*.
[Student Awardee Paper, Journal of Integrative and Comparative Anatomy](#)

- 2021 **Herbst, E. C.**, Lautenschlager, S., Bastiaans, D., Miedema, F., Scheyer, T. M. Modeling tooth enamel in FEA comparisons of skulls: comparing common simplifications with biologically realistic models. *iScience* 24(11)
- 2021 **Herbst, E. C.**, Felder, A. A., Evans, L. A. E., Ajami, S., Javaheri, B., Pitsillides, A. A. A new straightforward method for semi-automated segmentation of trabecular bone from cortical bone in diverse and challenging morphologies. *Royal Society Open Science* 8(8) Our image was selected for the [journal cover](#)
- 2020 Ortega-Jimenez, V. M., **Herbst, E. C.**, Leung, M. S., and Dudley, R. Natural barriers: waterfall transit by small flying animals. *Royal Society Open Science* 7201185
- 2019 **Herbst, E. C.**, Doube, M., Smithson, T. R., Clack, J., and Hutchinson, J. R. Bony lesions in early tetrapods and the evolution of mineralized tissue repair. *Paleobiology* 45(4)
- 2010 **Herbst, E. C.** and Hutchinson, J. R. New insights into the morphology of the Carboniferous tetrapod *Crassigyrinus scoticus* from computed tomography. *Earth and Environmental Science Transactions of The Royal Society of Edinburgh* 109(1-2)

PAPERS IN REVIEW

- 2021 **Herbst, E. C.**, Evans, L. A. E.*, Felder, Jahaveri, B., Pitsillides, A. A. 3D profiling of mouse epiphyses across ages reveals new potential imaging biomarkers of early spontaneous osteoarthritis submitted to Journal of Anatomy

OPEN ACCESS WORK

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|-----------------------|---|
| NEW METHODS/CODE | <ul style="list-style-type: none"> • Python-based Blender plugin for modelling 3D muscles • method for visualizing joint range of motion • method for automatic segmentation of trabecular bone • Blender remeshing guide for FEA |
| FEZ INITIATIVE | Founder of Finite Element Zurich |
| CT DATA AND 3D MODELS | available on Morphosource and Figshare |
| OPEN ACCESS COURSE | Completed Open Life Science Program fall 2020 |

INVITED TALKS, CONFERENCE PRESENTATIONS, TEACHING

- gave 10 invited talks and 23 international conference presentations (10 presented by myself, 13 by students and collaborators)
- winner of 2 awards for best talk
- taught courses and supervised students (undergraduate, master's, PhD) in biomechanics and evolution (more details [here](#))

PROFESSIONAL SERVICE

- 2021 - PRESENT Leading Artisynth Software Discussion Group
2020 organized [Finite Element Analysis Conference and Workshop](#) with over 200 participants
2018 Session Chair, Society of Integrative and Comparative Biology
Annual Meeting, San Francisco.
- PEER REVIEW PNAS, Clinical Biomechanics, The Anatomical Record, Journal of Anatomy,
Integrative Organismal Biology, Methods in Ecology and Evolution
Integrative and Comparative Biology, Canadian Journal of Earth Sciences

GRANTS AND FUNDING

- 2021 **ImagingBioPro Network [Online Educational Material Grant](#)**
development of educational materials (videos and guides) and code
[mesh manipulation](#) and [trabecular segmentation](#)
Funds: 1,000 GBP
- 2020 **University of Zurich [GRC Grant](#)**
Project: organized and hosted finite element analysis [conference and workshop](#) with over 200 participants
and developed a [website](#) and [Github organisation](#) for sharing finite element modeling methods
Funds: 10,000 CHF
- 2019 **[OATech+ Network](#) Biomechanics and Mechanobiology Pump Priming Fund**
Project: Using 3D trabecular architecture as a biomarker to identify and monitor osteoarthritis of the knee
Funds: 10,000 GBP
- 2019 **[OATech+ Network](#) Early Career Researcher Placement**
Placement with Prof Andrew Pitsillides at RVC to work on osteoarthritis project (see above)
Funds: 3,000 GBP
- 2019 **Royal Veterinary College Foreign Travel Fund**
To present research at ICVM conference
Funds: 300 GBP
- 2018 **Royal Veterinary College Foreign Travel Fund**
To present research at SICB conference
Funds: 300 GBP
- 2016 **Research Experience for Undergraduates, National Science Foundation**
Biomechanics research internship with Prof. Casey Holliday and Prof. Kevin Middleton, University of Missouri
Funds: 3,500 USD

OUTREACH AND VOLUNTEERING

- 2021 - PRESENT Volunteering as English and Math tutor for refugees
Students Across Borders
- 2022 Outreach video for [Biomechanics Research and Innovation Challenge](#)
- 2020 [Interview](#) with Real Scientists DE (in German)
- 2019 Outreach display, Early Tetrapod Evolution
Night at the Vet College, Royal Veterinary College, London
- 2017 Outreach display, Early Tetrapod Evolution
Annual Open Day, Royal Veterinary College, London
- 2017 Guest [blog post](#) about *Crassigyrinus* on Anatomy to You blog
- 2013-2016 Comparative anatomy outreach events at Safari West Wildlife Park

PROFESSIONAL DEVELOPMENT AND CERTIFICATES

- 2022 Good Clinical Practice [online course](#) and certification
- 2022 Data Analysis for Medical Research using R, Epidemiology, Biostatistics and Prevention Institute, UZH
- 2021 [GAMMA](#) Workshop Balgrist, Zurich: "Models, methods and functional tests in motion analysis".
Accredited by Swiss Orthopaedics (6 credits) and Physio Swiss (12 credits)
- 2021 [Scientific Programming with Python, Physics Department, UZH](#)
- 2020 [Open Life Science Course](#)
- 2020 [SlicerMorph 3D Morphometrics Course](#)
- 2019 Avizo Course 3DMAGINATION Ltd.
- 2018 MatLab Fundamentals Course
- 2017 Teaching and Learning in Higher Education Certificate Royal Veterinary College, London

LANGUAGES

ENGLISH: fluent
GERMAN: fluent